Programming the Home and Enterprise WiFi with OpenSDWN

Julius Schulz-Zander[1], Carlos Mayer[1], Bogdan Ciobotaru[1], Stefan Schmid[1,2], Anja Feldmann[1], Roberto Riggio[3]
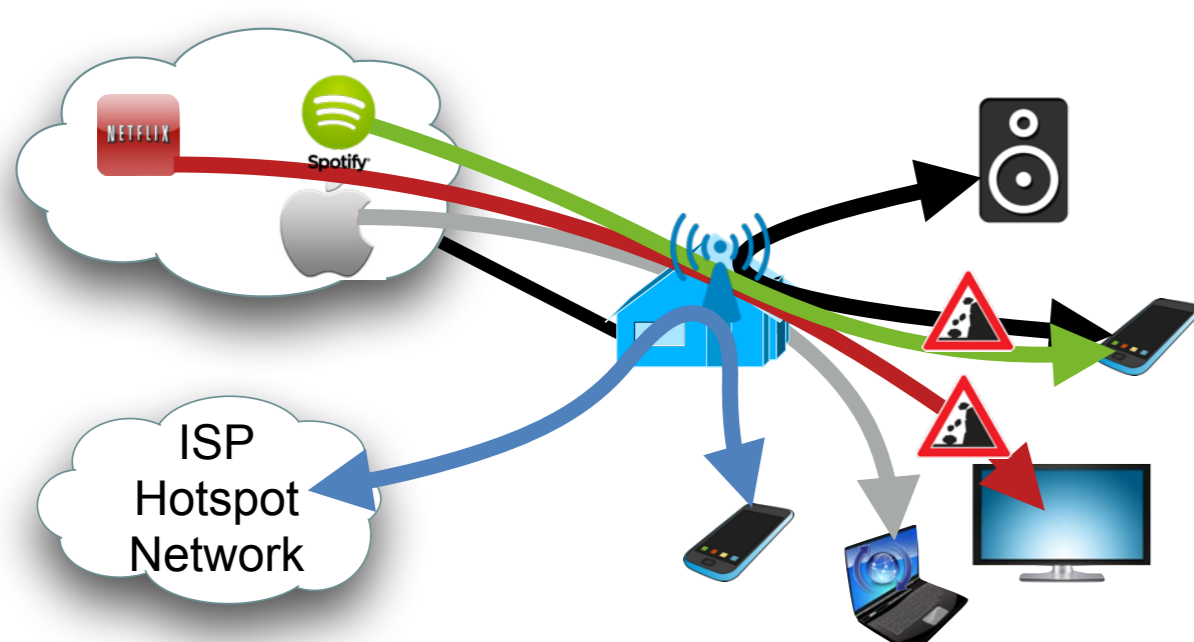
Motivation

- Wireless hop often critical for performance:
  - Non-stationary environment (Non-negligible delay, available bandwidth varies)
  - No user-defined service differentiation
- Software-Defined Wireless Networking (SDWN)
  - Introduces flexible control over many WiFi knobs
- Rarely managed in unison with network functions
  - Stateful firewalling, service differentiation, or intrusion detection
- OpenSDWN enables, e.g.:
  - User-defined service differentiation
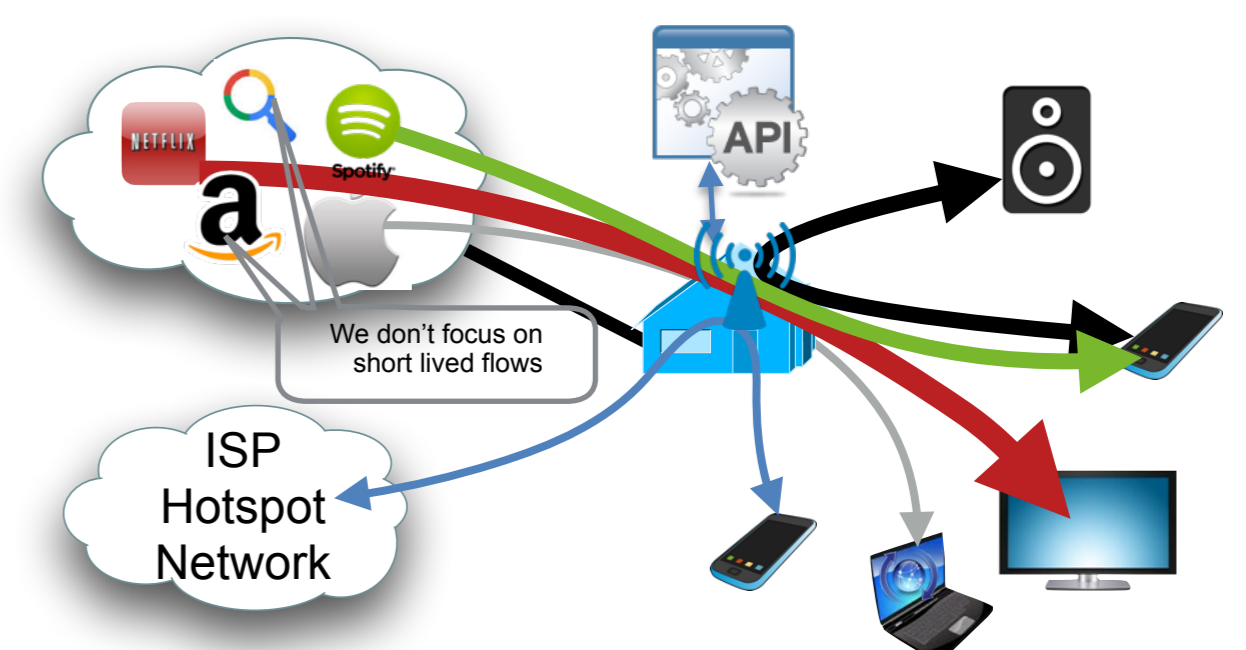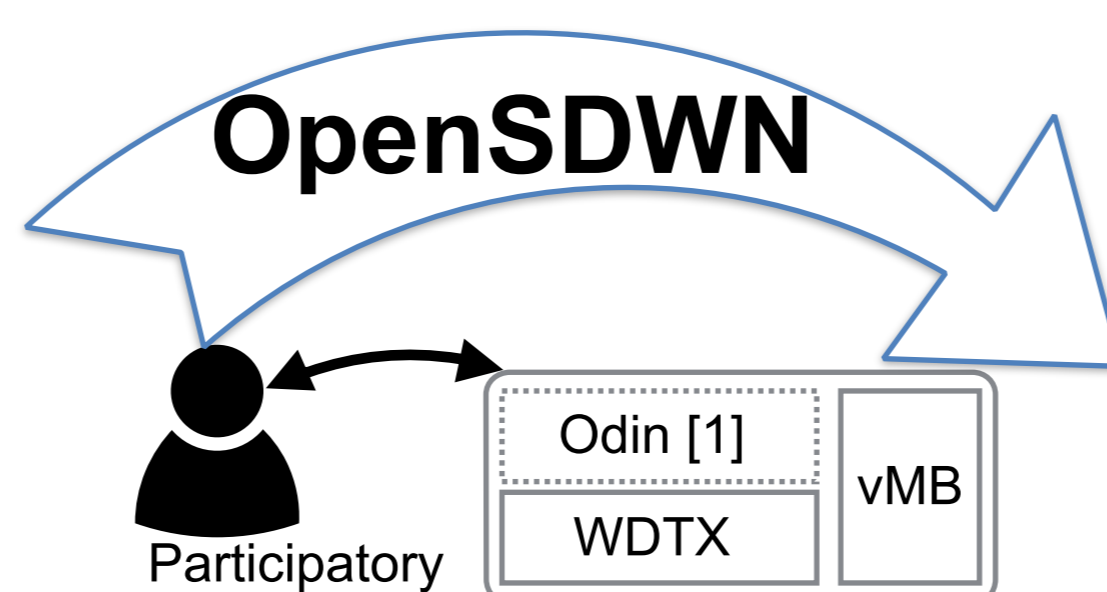 - Mobility and flexible function allocation

OpenSDWN

- Open Software-Defined Wireless Networking architecture
- Targets WiFi Deployments
- Combines the benefits of Wireless, SDN, and NFV:
  - Light Virtual Access Point Abstraction (Odin)
  - WiFi Data-Path Transmission Control (WDTX)
  - Virtualized Network Functions/Middlebox management (vMB)
  - SDN Interface for Ethernet (OpenFlow)
  - External API for Operators/Users (Participatory Interface)

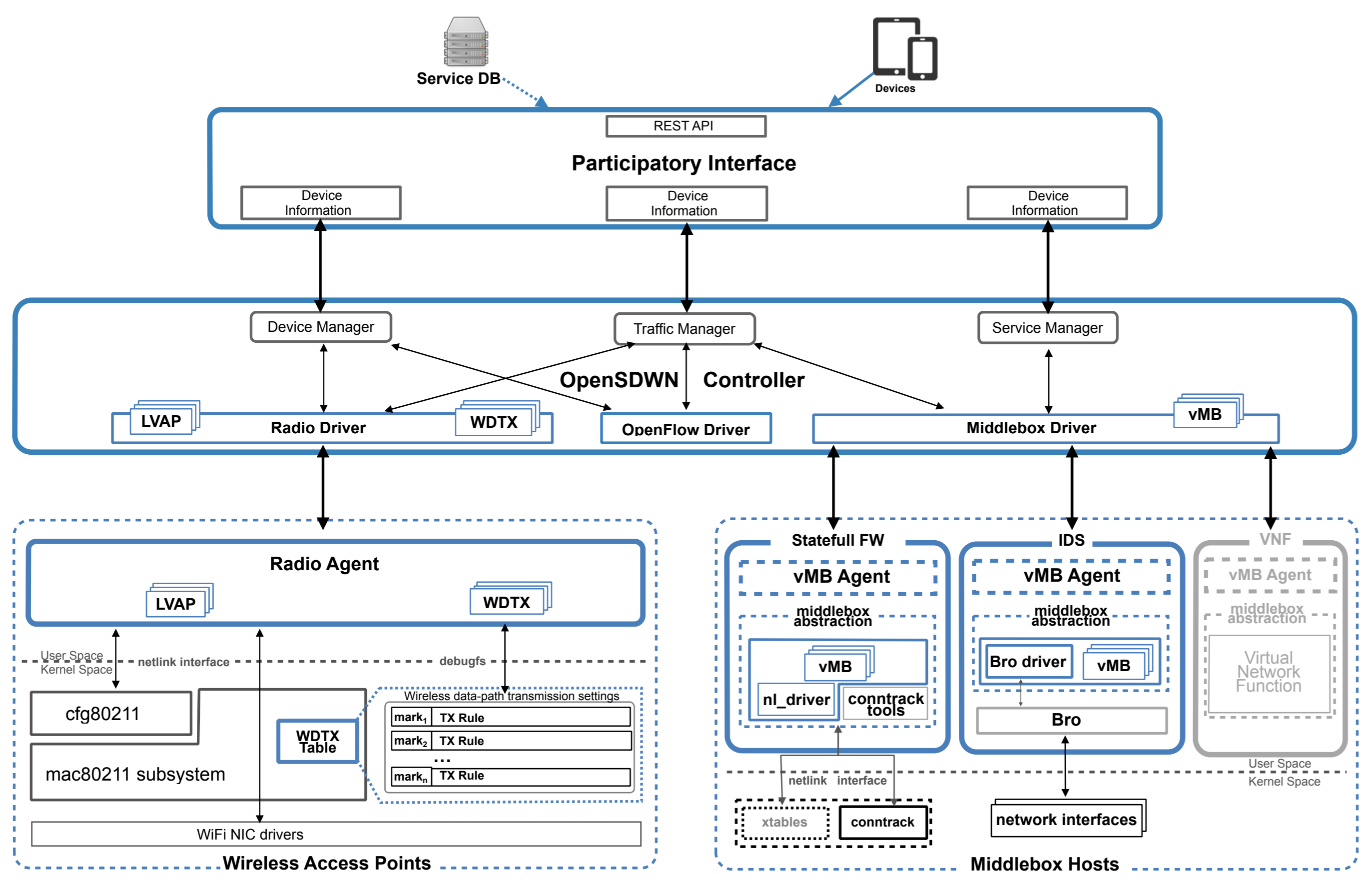## Demo: Enabling Fine Grained Traffic Differentiation via a Participatory Interface
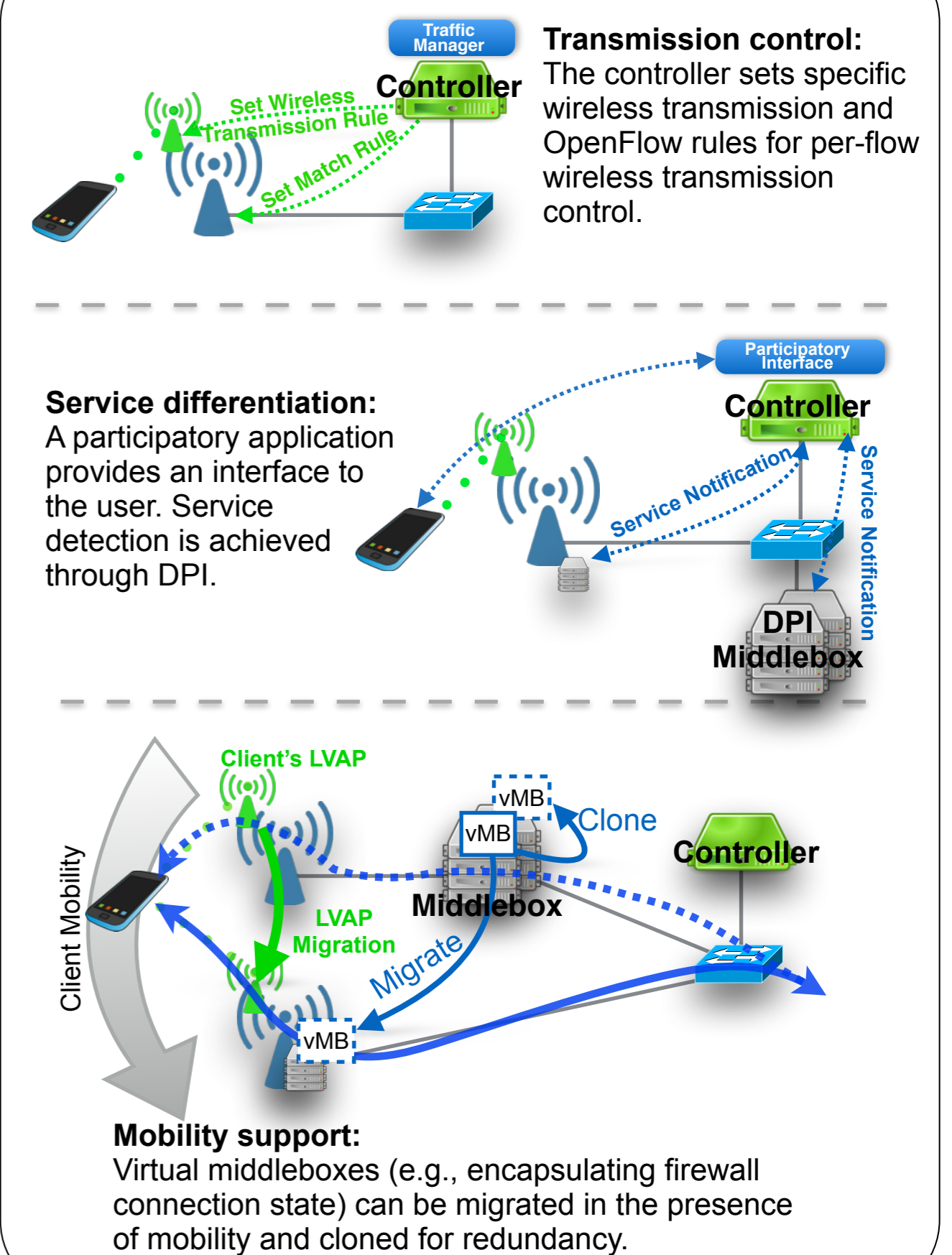

Just *Best Effort*

OpenSDWN

Odin [1] vMB
WDTX
Participatory

We don't focus on short lived flows

User-defined service differentiation

OpenSDWN Building Blocks

Example Operations

Transmission control: The controller sets specific wireless transmission and OpenFlow rules for per-flow wireless transmission control.

Service differentiation: A participatory application provides an interface to the user. Service detection is achieved through DPI.

Mobility support: Virtual middleboxes (e.g., encapsulating firewall connection state) can be migrated in the presence of mobility and cloned for redundancy.

Literature

[1] J. Schulz-Zander, L. Suresh, N. Sarrar, A. Feldmann, T. Hühn, and R. Merz. Programmatic orchestration of WiFi networks. In *USENIX ATC '14*.

[2] J. Schulz-Zander, C. Mayer, B. Ciobotaru, S. Schmid, and A. Feldmann. OpenSDWN: Programmatic Control over Home and Enterprise WiFi. In *ACM SOSR '15*.

Contact: Julius Schulz-Zander (julius@inet.tu-berlin.de), Stefan Schmid (stefan@inet.tu-berlin.de)

bowl — Berlin Open Wireless Lab

1) TU Berlin
2) Telekom **Innovation Laboratories**
3) CREATE-NET

Bundesministerium für Bildung und Forschung

SEVENTH FRAMEWORK PROGRAMME